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14. ABSTRACT
This study includes developing workload based metrics that can be used to evaluate OR performance, analyzing the surgical services at Reynolds Army Community Hospital (RACH) with these metrics, and comparing the performance of each of the surgical services in these metrics with the traditional utilization metric. The metrics include: Surgical RVU per Hour, RVU per Assigned Hour, RVU per Staffed Hour, Surgeon Cost per RVU, and Total Cost per RVU. An ANOVA identified a statistical difference among the performance of surgical services in each metric, including utilization rates, $p < 0.01$. For each metric, the surgical services were further analyzed with a post hoc Tamhane's T2 Test. Surgical Services were ranked according to performance in each metric. The ranking order was not the same across all six metrics; however, the top three surgical services were the same for all productivity based metrics. When compared to utilization rates, only one of these surgical services was ranked in the top three performers. The other two were ranked in the bottom three for utilization.

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Graduate Management Project

An Analysis of Operating Room Performance Metrics

at Reynolds Army Community Hospital

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U.S. Army-Baylor Graduate Program in Health and Business Administration

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Abstract

The purpose of this study was to develop workload based metrics that can be used to evaluate Operating Room performance, analyze the eight different surgical services at Reynolds Army Community Hospital (RACH) with these metrics, and compare the performance of each of the surgical services in these metrics with the traditional utilization metric. The five metrics that were developed include Surgical Relative Value Unit (RVU) per Hour, RVU per Assigned Hour, RVU per Staffed Hour, Surgeon Cost per RVU, and Total Cost per RVU. An analysis of variance identified that there was a statistical difference among the performance of surgical services in each metric, $p < 0.01$. There was also a statistically significant difference among the utilization rates of the surgical services at RACH, $p < 0.01$. For each metric, the surgical services were further analyzed with a post hoc Tamhane's T2 Test. Surgical Services were ranked according to performance in each metric. The ranking order was not the same across all six metrics; however, the top three surgical services were the same for all productivity based metrics. When compared to utilization rates, only one of these surgical services was ranked in the top three performers. The other two were ranked in the bottom three for utilization.

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Introduction

The Army Medical Department (AMEDD) is currently monitoring Operating Room (OR) performance at individual Medical Treatment Facilities (MTF) with utilization metrics that measure the percent of available time each OR is in use. Current literature suggests that there are many variables that can affect this type of metric. Civilian practice managers have been moving away from utilization metrics toward productivity or workload based metrics to evaluate surgeons, services, and their overall practice. This study will analyze whether or not there are productivity based metrics that can be used within AMEDD facilities to evaluate surgeons, services, and MTFs on OR performance and compare these metrics to the traditional utilization metrics currently being used.

Conditions that Prompted the Study

Reynolds Army Community Hospital (RACH) is a medium sized MTF located in Fort Sill, Oklahoma. RACH provides care to over 48,000 beneficiaries within its catchment area through its partnership with Humana Military Healthcare Services and surrounding Air Force Bases. As of August 2008, enrollment at RACH was 10,443 active duty soldiers, 13,130 active duty dependents, 4,507 retirees up to the age of 65, and 1,274 TRICARE plus enrollees, totaling 29,354 beneficiaries. A typical day in the first quarter of fiscal year 2008 would include 1439 clinic visits, six surgeries, and two births.

In order for RACH to accomplish its mission and achieve its strategic goals, each of the departments needs to continuously assess and evaluate their business practices and utilization of resources. MTFs are constantly being evaluated by the Regional Commands and the United

States Army Medical Command (MEDCOM) on their productivity and efficient use of resources. MTFs are tracked with a set of designated metrics and performance objectives that allow higher headquarters to compare similar sized MTFs to each other in order to aide in decision making. MEDCOM conducts studies to analyze MTF performance in specific areas in order to develop benchmarks for performance and evaluation. An example of this is a December 2007 analysis of surgical services across MEDCOM, conducted by LTC Goodman, Chief, Decision Support Center, Office of the Surgeon General. The purpose of the study was to gather data from the Surgery Scheduling System (S3) to look at OR utilization across the MEDCOM to "help identify means of optimizing employment of surgical services" (Goodman, 2007). The study found that several locations had low surgical volume or low complexity of cases across their surgical specialties, resulting in large amounts of staffed OR time without surgical cases during normal duty hours, or poor utilization of resources. If asked, the Decision Support Center was ready to make recommendations for cessation and reduction in surgical services for low producing locations according to this metric. When the report was published, RACH was utililizing 76% of its staffed OR Time with an average of 2 rooms fully staffed. MEDCOM's FY 07 goal for this metric was 90%. However, in FY 2008, the average utilization at RACH dropped down to 52%, with an average of two rooms fully staffed during normal duty hours. Optimizing OR utilization became a top priority of the Commander at RACH for the FY 09.

Upon discussing the utilization rates with the Chief of Specialty Care (Surgery) and Chief of Specialty Care Nursing, it became apparent that they had some questions as to the appropriateness and reliability of the utilization metrics used to evaluate the OR. They believed that utilization rates are easily manipulated by a number of variables and that the metric does not take into consideration the case mix index of the surgical procedures completed at individual

MTFs. They also suggested that evaluation metrics in the OR should coincide with the productivity standards for the Performance Based Adjustment Model (PBAM). PBAM is model MEDCOM uses to modify MTF budgets based on workload and efficiency as compared to a baseline performance (PBAM, 2009). At that time, inpatient surgical procedure workload did not contribute to overall PBAM funding. Surgeons were not getting credit for Relative Value Units (RVU) generated during inpatient surgical procedures. Is there a better metric to evaluate OR performance across the AMEDD and use as a tool to make strategic decisions concerning OR resources?

Statement of the Problem

In order for RACH to optimize productivity and maintain a full service community hospital, it must maintain its OR capabilities by demonstrating that there is a need for surgical services at Fort Sill. In order to do this, it must demonstrate through MEDCOM designated metrics that it is able to effectively utilize resources. The problem is deciding whether or not the OR utilization metrics set forth by MEDCOM are the most appropriate performance metrics. The current utilization metrics do not coincide with the workload based standards of performance and productivity for product lines and individual surgeons set forth in the AMEDD PBAM.

Research Questions

What are the productivity based metrics that may be used to evaluate OR performance? Are there differences among the individual surgical services in their performance within each of these metrics? How does the performance of surgical services compare across these metrics and with the traditional utilization metric?

Review of Relevant Literature

Overview

Over the past 30 years, economic factors in the OR have changed substantially. Technological advances have led to the development of minimally invasive surgical procedures that have helped to decrease morbidity, reduce the length of hospital stays, and improve patient outcome. Many of these advancements have increased OR costs in terms of supplies and time (Viapiano & Ward, 2000). However, the push for high rates of efficiency and utilization has not always been a driving force in the OR. Before managed care and capitated medical care payments, hospital collections for OR care were often five times greater than the actual costs to the hospital (Mazzie, 1999). Surgical cases were booked on a first-come, first-serve basis. As OR availability became an issue, hospitals started issuing blocks of OR time to the busiest surgeons or surgical services so that they could perform more elective procedures. Use of block time resulted in reduced utilization of the ORs, but during this period of fee-for-service reimbursement, most surgical suites only needed a utilization rate of 20% to produce a positive bottom line (Mazzie, 1999).

New trends in healthcare have led to an increased emphasis on efficiency and productivity throughout all areas of the hospital. The development of Diagnosis Related Group payments as well as reduction in fee-for-service rates and use of capitation rates as a result of the emergence of managed care have decreased reimbursements for hospital care (Mazzie, 1999). Effective utilization of surgical services has become an important goal for most hospital administrators. This is due to the fact that, on average, operating rooms generate about 42% of the hospital's revenue (HFMA, 2008). There are several evaluation methods being used to ensure that hospitals are effectively and efficiently using their allocated surgical resources. Two of the most prevalent methods analyze OR utilization and productivity.

Utilization

Traditionally, OR utilization is defined as the "the sum of the time it takes to perform each surgical procedure (including preparation of the patient in the OR, anesthesia induction, and emergence) plus the total turn-over time, divided by the time available" (Tyler, Pasquariello, & Chen, 2003, p. 1114). A utilization rate of 100% is both unrealistic and ill-advised. Eliminating all flex time in OR schedules hinder both its ability to handle emergency cases and respond to case duration variability. A study by Tyler, Pasquariello, and Chen (2003) reported that optimum OR utilization is between 85% and 90%. However, many ORs do not perform within these parameters. An industry study shows that the average OR runs at only 68% capacity (HFMA, 2008). Because many OR resources can be considered fixed expenses, adding one additional procedure per day per OR suite can generate from $4 million to $7 million in additional annual revenue for the average-sized organization (HFMA, 2008).

Effective utilization of the OR requires a balance of many conflicting factors and cannot be accomplished without an understanding of the facility's mission, finances, different departments, and data concerning utilization and costs (Viapiano & Ward, 2000). An understanding of these factors allows administrators to allocate and utilize OR resources in a way that is most beneficial to the hospital. In order to do this, administrators must take into consideration the different variables that affect OR utilization. Some of these variables include scheduling, case variability, preoperative care, and postoperative care.

Scheduling is a major factor in optimizing OR utilization. The two most common ways to schedule are first-come, first-serve (nonblock) booking and block booking. Nonblock booking often results in long waiting lines, high cancellation rates, a disparity between the utilization rates of surgical subspecialties, and difficulties scheduling urgent or emergent surgical cases (Viapiano & Ward, 2000). Block booking allocates OR time to surgical services or individual surgeons at a predetermined release time before the day of surgery. In this type of scheduling, rules for determining the amount of time allocated to each surgeon or service, when block time should be released, and how block time should be reallocated due to changes in utilization rates need to be developed (Viapiano & Ward, 2000). Many facilities allocate OR time based solely on historical utilization of OR time by surgeon, surgical service, surgical group or department (Dexter & Macario, 2002).

Other scheduling related issues that affect utilization are start times and turnover rates. A 2008 report released by the Health Financial Management Association (HFMA) states that the average OR only starts on time 27% of the time. The most efficient ORs meet their start time in 76% of their cases. Inefficient turnover can also cause delays. The average time between cases is 31.5 minutes; however, best practice ORs have a turnover time of 15 minutes. Both of these factors result in a decrease in the amount of available allocated time for surgery.

Case duration and variability in case duration may also affect utilization. Shorter cases are easier to schedule to maximize available OR time than longer cases. For example, if only one hour of unbooked time remained, it would be hard to achieve optimal utilization of the OR if a two hour case had to be completed. The OR would have to choose between leaving one hour of scheduled time empty, or booking the case and incurring the costs of one hour of overtime.

Variability in case duration is dependent on the patient, surgeon, and availability of supplies and equipment. Unforeseen complications, differing levels of surgeon experience and expertise, and equipment malfunctions can all affect the length of a case. One might expect the shorter and longer case times to average out, but because patients are given specific report times based on the predicted case length, they may not be ready for surgery if cases finish early. This variability makes it difficult to predict actual utilization for scheduling cases (Tyler, Pasquariello, & Chen, 2003).

Another factor that affects OR utilization is the evaluation of the patient during a preoperative clinic visit. The Joint Commission requires that a surgical history and physical, anesthesia assessment, nursing assessment, and necessary testing be done before surgery. Preoperative visits improve patient satisfaction, reduce unnecessary testing and consultation, decrease duration of hospital stay, and identify risk factors that are effective predictors of hospital costs. Preoperative intervention to reduce these risks has been shown to decrease operating room cancellations and delays (Correll, Bader, Hull, Hsu, Tsen, & Hepner, 2006). Correll and colleagues (2006) report that cancellations result in approximately $1,500 per hour of lost revenues and that delay costs in 1999 were approximately $10 per minute.

Finally, the availability of postoperative care resources, including Intensive Care Units (ICU), hospital wards, and Same Day Surgery (SDS) clinics, affects the ORs ability to utilize available surgical time. Hospitals with high ICU and ward occupancy rates are limited in the number of inpatient surgeries they can perform. On the other hand, hospitals with inefficient SDS clinics may be limited in the number of outpatient surgeries that can be completed during allocated OR time.

As a result of the impact of the many variables that affect utilization, many administrators believe that traditional OR management metrics that rely on utilization do not effectively represent an accurate picture of how the OR is operating. Wachtel and Dexter (2008) published a report which outlines arguments against making tactical decisions in the OR based on utilization.

First, they state that utilization percentages can be artificially inflated. An easy way to do this is to decrease the amount of time available by closing a room, or increasing the length of the procedure. As previously stated, the length of the procedure includes induction, patient preoperative preparation, the actual procedure, emergence and turn-over time. A longer turn-over time would produce a higher utilization rate, but would result in a less productive and efficient OR suite. Wachtel and Dexter (2008) also argue that estimates of utilization are not accurate for individual surgeons and that subspecialties with longer case durations tend to have lower utilizations. Both of these reasons relate back to the effect that case duration and variability in case duration have on a utilization metric. More experienced surgeons are able to complete cases in a shorter amount of time. If an experienced and novice surgeon completed the same number of cases within an allotted block of time, more than likely, the novice surgeon would have a better OR utilization rate because he took up more of the allotted time to complete the surgeries. If the expert surgeon did eight cases in the same time it took the novice surgeon to do six cases, according to the definition, their utilization of OR time would be equal. It is apparent that a utilization metric does not adequately represent performance or productivity in the OR suite.

Finally, Wachtel and Dexter (2008) argue that utilization is poorly related to contribution margin and variable costs. They believe that OR time should be allocated to surgeons or subspecialties with the highest contribution margin per OR hour, not just on raw utilization of available OR time. A recent case study on OR time allocations reported that "allocating OR time strictly on the basis of OR utilization may be financially inadvisable. Raw utilization is a very poor surrogate for contribution margin" (Dexter, Blake, Penning, & Lubarsky, 2002, p. 140). Another study by Dexter, Macario, Traub, and Lubarsky (2003) states that a surgeon's contribution margin to the hospital may vary several hundred percent from surgeons with the same OR utilization. This study also points out that looking at OR utilization rates does not take into account variable costs incurred by surgeons for each hour of allocated OR time.

Utilization in the AMEDD

The AMEDD currently uses utilization metrics to track and manage OR performance. One of the six focus areas found in the MEDCOM Fiscal Year 2010-2012 Business Planning Guidance is effective OR utilization. In this document, the Decision Support Group (DSG) suggests that MTFs review their surgical scheduling patterns from S3 data in order to optimize OR utilization and improve the efficiency of the direct care system. The DSG also advises MTFs to review the OR utilization metrics on the AMEDD Command Management System (AMEDD CMS) website to help identify areas of OR utilization that can be improved at each MTF.

There are several metrics associated with OR utilization on the AMEDD CMS website. Table 1 highlights the fiscal year 2009 MEDCOM performance targets, MEDCOM's performance averages, and RACH's performance averages for each of these metrics as of

February 2009 (AMEDD CMS, 2009). The first is the Percent of Nurse Case to Staffed OR Time. This is calculated by dividing the total number of staffed OR minutes by the Nurse Case Time. The Nurse Case Time is defined as the time from the start of set-up to the end of clean-up. This mirrors the traditional definition of utilization (AMEDD CMS, 2009). RACH performed below the MEDCOM average and benchmark for this metric. The website reports that this is not the preferred metric for looking at utilization because inefficiencies in set-up or clean-up can artificially inflate the utilization rate. The preferred metric is the Percent of In-Room to Staffed OR Time. It is defined as the total staffed OR minutes divided by the in-room time. RACH's performance was below the MEDCOM average and MEDCOM target. As previously stated, Case Set-Up and Clean-Up time is another metric that affects OR utilization and efficiency. Although RACH was below the MEDCOM target for this metric, it performed better than the MEDCOM average. Other metrics on the AMEDD CMS webpage measure Used and Un-used Time in the OR, Average Number of Main OR Cases, and a count of the number of Surgical Procedures.

Table 1.

AMEDD CMS OR Utilization Metrics

	Metric		
	Percent Nurse Case to Staffed OR Time	Percent of In-Room to Staffed OR Time	Case Set-up and Clean-up Time (min)
MEDCOM Target	85%	75%	< 25
MEDCOM Performance	76%	57%	35
RACH Performance	57%	42%	29

The DSG also advises that MTFs take several key points into consideration when formulating their business plan. These include: (a) the impact of disenrollment of Retirees; (b) restriction of clinics to Active Duty patients only; and (c) the effect of scheduling an insufficient number of cases each day (Schoomaker, 2009). An understanding of beneficiaries' demographic information is important when analyzing utilization rates and developing a strategic mission for the hospital's surgical services. Age demographics are particularly important when analyzing utilization in the OR. Individuals over the age of 65 require more medical services than their younger counterparts. In 1999, the National Hospital Discharge Survey reported that patients aged 65 and older comprised 12% of the population, but accounted for 40% of hospital discharges and 48% of days of inpatient care (Etzioni, Liu, Maggard & Ko, 2003). A study on the impact of age on surgical services conducted by Etzioni and colleges (2003) reported that the over 65 population accounts for 88% of procedure based work in Ophthalmology, 70.3% of Cardiothoracic surgery, and 64.8% of procedure based work in Urology. Patients aged 45 to 64 years old comprise 22.8% of the population and account for 39.1% of Neurosurgical and 31.8% of Orthopedic surgeries. Children under the age of 15 make up 21.1% of the population, but account for 39.6% of all Otolaryngology surgical cases. To increase utilization, hospitals need to offer surgical services that meet the needs of the population that they serve. MTFs have a unique challenge because the population they are required to serve does not include the demographic groups with the highest utilization rates of inpatient and surgical services. Sometimes smaller MTFs do not have the capabilities to enroll many retirees as beneficiaries, resulting in a missed opportunity for OR demand and negative effect on OR utilization rates.

Productivity

Traditionally, utilization rates were a reflection of the time patients spent in the OR. This rewarded surgeons for occupying ORs, but does not address cost efficiency or productivity of surgeons (Viapiano & Ward, 2000). A commonly accepted way of looking at productivity is by using the Resource-Based Relative Value Scale (RBRVS). Medicare originally implemented the RBRVS in 1992 as a basis for all physician reimbursement; since then it has increasingly been used as a tool by which administrators can compare practice and individual physician volume, efficiencies, and productivity. The RBRVS system determines a RVU for each Current Procedural Terminology (CPT) code. These RVUs are then multiplied by a conversion factor to determine the reimbursement value for a specific procedure. Hospital administrators must have a comprehensive understanding of the RBRVS and RVUs in order to utilize them as tools in practice management.

RVUs are "nonmonetary relative units of measure assigned to medical CPT codes copyrighted by the American Medical Association" (Glass & Anderson, 2002a, p. 225). RVUs are divided into three components. The physician work component measures a provider's involvement in a procedure and is based on procedure complexity, intensity, and the degree of judgment and decision-making skills required. The practice expense component measures the overhead, or direct and indirect medical support needed for performing a procedure. The malpractice component measures the risk associated with performing a procedure. The average breakdown for RVU composition is 54% work component, 41% practice expense component, and 5% malpractice component (Glass & Anderson, 2002a). RVUs are standardized across the country; however, there are Geographic Practice Cost Index (GPCI) values assigned to each of the three components to adjust for differences in practice expenses in different regions (Jan Bergman, 2003). RVUs are increasingly being used for practice management in the categories of productivity, costs, and benchmarking.

There are a wide variety of ways that medical groups track provider productivity including total costs, patient panel size, hospital admits and visits, number of consults, procedural volume, and number of cases. There are many factors that affect these metrics and different combinations of all of these metrics can be used among different medical groups, resulting in varied interpretations of performance and productivity. For example, a practice that only keeps track of procedural volume or encounters may think that certain surgeons are outperforming other surgeons, but this method does not take into account case complexity and mix, staffing and workload, or procedure costs (Glass & Anderson, 2002b). RVUs provide an accurate measurement of clinical productivity in non-financial terms. Therefore, RVUs provide an objective means for evaluating physician productivity. Physicians who perform a moderate number of complex procedures can generate more RVUs than a physician who performs a high number of simple procedures. RVU productivity can be calculated for each provider by obtaining the RVU work component for each CPT code, multiplying the code frequency by that value, and totaling the RVU work component in order to calculate the physician total RVU work productivity (Glass & Anderson, 2002b). Administrators are able to use this reliable, quantitative data to track trends and performance, as well as facilitate change within their organizations.

Resnick, Corrigan, Mullen, and Kaiser (2005) conducted a study outlining the differences in productivity among surgical specialties by analyzing the RVUs produced per OR hour. They concluded that certain specialties contribute more to the hospital bottom line by generating more RVUs than other specialties that use more OR time. It is not only the amount of time a service utilizes in the OR, but also the type of surgery being performed that generates RVUs and financially contributes to the organization.

RVUs are increasingly being used in cost analysis and accounting. RVU cost accounting is used to determine the cost to produce each RVU. Medical groups can look at the sum of the total expenses divided by the sum of the total RVUs to get a cost per RVU value, or they can look at each individual RVU component. The typical time period for the analysis is year-to-date, ensuring that the expense period and productivity period match. Glass and Anderson (2002c) recommend that a cost analysis for blended and work RVUs be performed annually. A blended RVU is the sum of all three RVU components for a given CPT code. To figure out the average amount a practice is paying their providers per work RVU, administrators divide the sum of the total provider compensation expenses by the sum of the total work RVU to get the cost per work RVU. Each subsequent component is figured out using the same method as seen below.

$$\textbf{Cost/RVU}_{\mathbf{w}} = \textbf{Total provider compensation expenses/ Total RVU}_{\mathbf{w}}$$

$$\textbf{Cost/RVU}_{\mathbf{pe}} = \textbf{Total practice expenses/ Total RVU}_{\mathbf{pe}}$$

$$\textbf{Cost/RVU}_{\mathbf{m}} = \textbf{Total malpractice expenses/ Total RVU}_{\mathbf{m}}$$

$$\textbf{Cost/RVU}_{\mathbf{blended}} = \textbf{Total expenses/ Total RVU}_{\mathbf{blended}}$$

Costs per procedure for a given CPT code can be calculated by multiplying the total RVUs for a procedure by the blended cost per RVU (Glass & Anderson, 2002c). Another cost accounting model developed by Viapiano and Ward (2000) suggest that a new metric for evaluating OR suites that addresses cost efficiency and productivity could be to look at revenues minus expenses per minute, sorted by CPT code. This would provide the net profit margin generated by a surgeon for each minute of a given surgical procedure. Aside from monitoring the performance and efficiency of providers within a practice, RVU cost accounting can also be used as a basis for other financial aspects of practice management such as analyzing fee schedules, evaluating profitability of third-party payments, calculating a floor capitation rate, and allocating capitation payments among physicians.

Administrators are increasingly using RVUs for benchmarking in their practice management because they provide an objective means for evaluating both individual physicians and practice performance. Since RVUs are nationally standardized as part of the RBRVS developed by the Centers for Medicare and Medicaid Services (CMS), they provide the best measurement tool that is statistically valid and reliable for benchmarking (Glass & Anderson, 2002d). Shackelford (1999) agrees that benchmarking with RVUs is the preferred method for evaluation, especially when addressing the perceived inequity between daily revenues generated by Primary Care Managers and Surgeons. A commonly accepted external benchmarking resource is the Medical Group Management Association (MGMA) standards. MGMA conducts an annual survey of physician compensation and production in order to provide summary statistics regarding the compensation and production levels of physicians in MGMA member group practices. The survey includes data on physician total RBRVS units and RBRVS units by specialty. The data include the mean, standard deviation, 25th percentile, 75th percentile, and 90th percentile of RVU units produced. This tool provides accurate comparisons of physician productivity with other physicians in the same specialty and therefore can be used by practice administrators to evaluate the compensation and productivity ranges of physicians.

Fogel (2000) argues that hospitals should use RVUs to develop internal benchmarking. He warns that hospitals should avoid external benchmarking before reliable productivity standards are in place. The internal benchmarking process should begin with an examination of each department's performance over the past several years in order to provide a foundation against which to evaluate current performance. Administrators should choose a unit of service, such as a RVU, and compare hours per unit (RVU) data with the same data from a previous time period. This comparison should not distinguish between fixed and variable costs. It is aimed at calculating whether a department's productivity has improved or worsened. Next, the difference in productivity should be multiplied by current workload volumes at current salary rates for each year. This will result in an illustration of the impact of changes in productivity for the year's studies in both hours and wages (Fogel, 2000).

When looking at RVUs, it is important to understand the factors that affect them. Glass and Anderson (2002a) emphasize that coding is the key to RVU analyses. They warn that RVU analysis will reflect skewed data if medical services and procedures are not accurately or appropriately coded. However, before coding can ever take place, it is imperative that physicians properly document the exams and procedures they perform on patients.

Productivity in the AMEDD

The AMEDD currently uses RVUs as a benchmark for performance objectives, to track productivity, and to allocate funding for all of its MTFs. However, the RVUs are adjusted, and blended (total) RVUs do not include the malpractice component. MTF funding is tied directly to workload performance in accordance with the PBAM. In FY 2007, MEDCOM implemented

PBAM across the AMEDD. This model adjusts a MTF's budget based on the workload that it generates as compared to a performance goal and adjustments made for efficiency.

There are three main reports for PBAM; the Product Line Summary, the Financial Summary, and the Workload Summary. The Product Line Summary reports a month unique adjustment update by product line. The Financial Summary reports the total adjustment in funding for the current month, running totals by month, and month-by-month unique adjustments. The Workload Summary reports actual workload and baseline data for comparison, as well as a performance summary of the top three and bottom three MTFs (PBAM, 2008).

The primary report for PBAM is the Product Line Summary Report. It is divided into five sections; the Ambulatory Section, the Inpatient Section, Miscellaneous Adjustments, Adjustments Summary, and Evidence Based Practice. The first two sections focus on productivity by product line. Product lines are associated with a three character Medical Expense and Performance Reporting (MEPRS) code. The first character identifies the product line as either Outpatient "B" or Inpatient "A". The second character represents the summary account (e.g., "A" is medical and "B" is surgical). The third character represents the subaccount, or work center for the specific service within the product line. There is an optional fourth level code that can be used to differentiate between like clinics (Army Medical, 2009). For example a fourth level code can be used to look between two different Family Practice Clinics at the same MTF. Also, SDS clinic procedures can be identified with the number "5" in the fourth level code. The workload is credited to the appropriate MEPRS 3 Code.

The Ambulatory Section uses RVU data from the MHS Management Analysis and Reporting Tool (M2), provider Full Time Equivalent (FTE) data from the Expense Assignment

System IV (EASIV) and the Prospective Payment System (PPS) rates by product line to provide budget adjustments based on outpatient productivity. PBAM uses the Simple RVU from M2 for ambulatory calculations. According to the M2 data dictionary, the Simple RVU is a summation of the work RVUs of all CPT codes in an encounter, with no adjustments of any kind. Outpatient product lines are Dermatology, Ear Nose and Throat, Emergency Room, Internal Medicine Subspecialty, Mental Health, Obstetrics, Optometry, Orthopedics, Primary Care, Surgery, and Surgical Subspecialty. A complete list of Outpatient Product Line descriptions with corresponding three digit MEPRS Codes are listed in Appendix A. In order for an MTF to receive credit for provider productivity, the patient encounters must be completed and closed in the Standard Ambulatory Data Record (SADR). All outpatient workload is distributed to the appropriate product line based off of the MEPRS 3 code.

PBAM uses the MHS PPS rates that are established by the TRICARE Management Activity (TMA) and adjusts off the Military Personnel (MILPERS) expense by product lines specific to each MTF. This is equivalent to the dollar per RVU for each product line. The PPS rates are based on the price at which care can be purchased in the private sector, or the Champus Maximum Allowable Charges (CMAC). Workload targets, or RVUs, are calculated by multiplying the FTEs times the RVU/Provider/Day standards for each product line. RVU standards are established by the Health Policy and Services Division at USAMEDCOM and approved by the Army Surgeon General. Product line RVU values are based off of the MGMA academic standards. The values are adjusted to account for data entry inefficiencies with the Armed Forces Health Longitudinal Technology Application (AHLTA) and Composite Health Care System (CHCS), the MHS's mission, and the increased training requirements to accommodate a constantly changing staff due to permanent change of stations and deployments.

Finally, all of the adjustment factors are combined into a single adjustment that establishes the 85% of MGMA RVU standard baseline used in the PBAM. The adjusted RVU/Provider/Day standard, found in Appendix B, is multiplied by 21 days to determine a monthly RVU performance target per FTE, by product line (PBAM, 2008). PBAM calculates an earnings target based off of the adjusted RVU standard and PPS. MTF earnings are adjusted based on the actual workload completed by product line at the MTF, compared to the target earnings.

The Inpatient Section of PBAM uses MILPERS adjusted PPS rates, Available FTEs, MHS Average length of stay targets, and generated Relative Weighted Products (RWP) to calculate inpatient performance earnings for each of the inpatient product lines. These product lines and their associated Major Diagnosis Codes (MDC) include: (a) Circulatory; (b) Digestive; (c) Ear, Nose, Mouth, and Throat; (d) Gynecological; (e) Mental Health; (f) Nervous System; (g) Newborn; (h) Obstetrics; (i) Orthopedics; (j) Other; and (k) Respiratory. A complete list of Inpatient Product Line descriptions are listed in Appendix C.

The RWP is a DoD measure of workload that represents the relative resource consumption of a patient's hospitalization compared to other inpatients. They are generated after the completion of a CHCS Standard Inpatient Data Record (SIDR). The PPS rate for the inpatient section is determined by multiplying the RWPs by a MTF specific rate per RWP for that year (Baker, 1992). The hospital costs for inpatient surgeries are grouped in with the treatment associated with specific MDC RWPs. However, these RWPs do not include or represent workload (RVUs) generated by individual physicians performing procedures or rounds on inpatients.

Historically, PBAM did not account for or fund MTFs for inpatient workload. However, new FY 2009 PBAM updates include an Inpatient RVU Section as a means to capture inpatient workload. PBAM uses the following formula to calculate inpatient performance earnings:

(Work RVU x Work RVU rate) + (PE RVU x PE RVU rate) = Performance Earning

TMA established the RVU and Work and PE GPCI rates. The information for this section is pulled from M2 Direct Care Professional Encounters with a MEPRS code "A". Each clinic at RACH is assigned an "A" MEPRS 4 code for the purpose of capturing inpatient workload. For inpatients, a RNDS appointment type will be automatically generated upon admission and each night at the census hour in the A MEPRS code of the service that is following them. All workload that occurs within this 24 hour appointment, including E&M codes, Inpatient Professional Service Rounds (IPSR), and procedures, are coded under these A MEPRS codes (MEPRS Guidelines, 2009). Providers can document these encounters under the Industry Based Workload Assignment (IBWA) clinic in AHLTA, or in the paper in-patient chart. This method captures the CPT codes for all inpatient surgeries completed in the MTF. After coding, an associated RVU value will be credited to the appropriate service and provider.

It is evident that MTFs rely heavily on RVU benchmarking. Providers are expected to perform in accordance with the RVU/FTE/Day standards and are evaluated on a monthly basis at the Data Quality Committee Meeting. At these meetings, the Data Quality Committee looks at provider productivity in the terms of RVUs as well as any SIDR/SADR encounters that they have failed to close. Deputy Commanders for Administration at the MTFs are now being held accountable for coding accuracy and timely close out of encounters and receive a quarterly administrative report card. These types of initiatives will encourage MTFs to work toward increasing efficiencies and productivity and will result in better accuracy of actual workload data for MTFs.

Purpose of the Study

The purpose of this study is threefold. The first is to create a set of productivity based metrics that capture all workload generated in the actual OR to be used to evaluate OR performance and efficiency at RACH. The second is to determine if there is a statistical difference among the different services in each of the productivity based metrics. The third is to compare these results with traditional utilization metrics to see if the same services perform the best according to rank for both productivity and utilization metrics.

Hypothesis

H1: There is a significant difference among the surgical services in their workload generated per surgical hour.

H2: There is a significant difference among the surgical services in their workload generated per assigned hour of OR time.

H3: There is a significant difference among the surgical services in the amount of workload generated per hour of support staff in the OR.

H4: There is a significant difference among the surgical services in the amount paid to providers per unit of workload generated in the OR.

H5: There is a significant difference among the surgical services in the total costs allocated to the OR per unit of workload produced by each surgical service in the OR.

H6: There is a significant difference among the surgical services in the utilization rate of assigned block times in the OR.

Methods and Procedures

Unit of Analysis

The unit of analysis for this study is each surgical service at RACH. There are eight surgical services at RACH. These include General Surgery (GEN SURG), Ophthalmology (OPHTHO), Otolaryngology (ENT), Urology (URO), Obstetrics/Gynecology (OBGYN), Orthopedics (ORTHO), Podiatry (POD), and Oral Surgery (ORAL). The eight surgical services share four General ORs and one Urology OR in the surgical suite. The OR at RACH utilizes a block scheduling technique and services are assigned different blocks (or hours) of time each month. Surgeons within each service split their time between clinic visits, inpatient rounds, and surgery in the OR. The surgical services are dependent on the support of the ICU, Progressive Care Unit (PCU), Labor and Delivery Unit (L&D), SDS clinic, and PACU for pre-operative and post-operative care of patients undergoing surgical procedures. RACH currently supports 43 inpatient beds in the ICU, PCU, and L&D unit. The SDS Clinic has capacity for 10-15 patients per day. Limited space and ability to recover patients in these areas has been a limiting factor to the number of surgeries certain services can perform on a daily basis.

Data Sources

Data for this study were gathered from three sources: S3, EAS IV, and M2. All of the data for this study were consolidated in a Microsoft Excel spreadsheet which served as the study database.

S3 is a web-based scheduling tool used by the AMEDD. The system streamlines how operating rooms and staff are scheduled, provides patient demographics, and assists with reporting. The U.S. Medical Information Technology Center (USAMITC) has been deploying

S3 since 2003 (USAMITC, 2008). This study will use S3 to gather information on providers and surgical services in regard to cases completed and time allocated and used in the operating room suite. On April 20, 2009, all FY08 and FY09 data including surgeons, procedures, start time, in-room time, out of room time, and end-times were exported from S3 into an excel spreadsheet. Additionally, assigned hours and utilization rates for each service for FY08 and FY09 were downloaded to an excel spreadsheet.

EAS IV, an automated information system, is a centralized web-based application and data repository that enables standardized processing and reporting of financial, personnel, and workload data at the MTF. Within the Department of Defense (DoD), EAS IV is the primary source of cost data for multiple studies and for the calculation of rates for third-party collections. EAS IV collects expense, obligation, performance statistics, workload, and manpower data through automated system interfaces including the Composite Health Care System (CHCS), the Army's Workload Management System for Nursing (WMSN-A), the Standard Finance System (STANFINS), and the Defense Medical Human Resources System – internet (DMHRSi). DMHRSi enables system administrators to account for the daily utilization of personnel working within the MHS. EAS IV provides the end user with greater flexibility in data entry and report generation as well as the capability to determine cost per product (EAS IV pamphlet). These features will be used to calculate cost per RVU in this study. An EASIV data pull was completed on 20 March 2009 to gather information on pertinent support staff and provider information for Fiscal Year (FY) 08 and FY09. The support staff variables include fiscal month, fiscal year, net direct expenses, D step-down expenses, E step-down expenses, total expense costs, and available support staff FTEs. Expenses for the OR are designated with a 4th level functional cost code of DFBA. D expenses are step-down ancillary costs allocated to the OR and

E expenses are administrative costs allocated to the OR. The provider variables include fiscal year, fiscal month, 4th level functional cost code (same as MEPRS code), available FTE, and available salary expense.

M2 is a tool that the AMEDD uses to capture both direct care encounters and purchased care claims as data sources. It is a set of MHS data files from MTFs, managed care support contractors, the Defense Manpower Data Center, and Pharmacy Data Transaction Service that are incorporated into a central database (MHSPHP, 2008). M2 allows users to perform trend analyses, conduct patient and provider profiling studies, and identify opportunities to increase health care utilization at all MTFs. M2 is also used to provide proactive health care management, identify patients for disease management programs, monitor patients' use of services, and support strategic health care planning (Military Health Systems Help Desk, 2008). For this study, a M2 query was completed on March 20, 2009. The variables included FY (2008, 2009), Fiscal Month (FM), Service Date, Encounters, Treatment DMIS ID, Treatment DMIS ID Name, Procedure 1, Procedure 2, Procedure 3, Procedure 4, Procedure 1 RVU, Procedure 2 RVU, Procedure 3 RVU, Procedure 4 RVU, Simple RVU, MEPRS 4 Code, and Provider ID. The validity of the data was achieved by crosschecking the list of procedures for each provider in the M2 data pull with the list of procedures by provider in the S3 data base.

Data Organization and Consolidation

This research project includes all available M2, S3, and EASIV data pertaining to the OR workload and staffing from December 01, 2007 through December 31, 2008. Utilization data from S3 reports the amount of hours assigned to and used by each surgical service. There is no data for October 2007 on OR utilization. The Podiatry Service was not allocated any block time from June 2008 through December 2008; therefore, there are no utilization rates for Podiatry during that time period. The Oral Surgery Service was not allocated any block time in November 2007, November 2008, or December 2008; therefore, there are no utilization rates for Oral Surgery during those months. The allocation of OR block time from the utilization data was the foundation for assigning support staff hours and costs to the different services. October 2007 was not included in the study because of the missing utilization data that is needed for calculations in the other metrics. November 2007 data was not included in the study because there were outliers in each metric due to assigned time reporting in S3. Podiatry and Oral Surgery have a smaller sample size because there were months during the study that those services did not perform surgery. This was either due to the fact that they were not assigned any OR block time, or they were assigned time but did not have any surgeries. In order to keep the samples sizes consistent for all of the metrics, the time period for the study was limited to December 2007 through December 2008.

Once all of the data were downloaded, a research database was created in excel that combined procedural data from S3 and M2. Utilizing the design from Glass and Anderson (2002b), a data table was created for each service line in order to capture and organize workload. Each line of data contains information on all of the procedures required to complete a single surgery. It includes the surgeon, the surgical service, the type of procedure(s) being performed, the time it took to complete the procedure(s), the CPT code assigned to that procedure(s), the RVU value associated with that CPT code(s), and the total number of RVUs for the entire surgery. The CPT codes and RVU values were pulled from the M2 database. The time to complete the procedure, the in-room time, and the name of the procedures being performed were pulled from the S3 database. The information on individual surgeon and surgical service was pulled from both databases. The validity of the data was checked by comparing surgical services and surgeon reported for each line of data from the two databases. Also, CPT codes from M2 were compared to the name of the procedure being performed from S3 to validate each line of data in the table.

There were a total of 2240 surgeries listed in S3 for the time period of the study. The M2 data pull only accounted for 93% of those surgeries. The breakdown of missing data by service line is listed in Table 2 below.

Table 2

Missing Data

	Surgical Service								
	GENSURG	OPHTHO	ENT	URO	OBGYN	ORTHO	POD	ORAL	Total
Total	512	95	381	225	464	511	27	25	2240
Missing	34	1	11	15	72	17	1	2	153
Percent	6.64%	1.05%	2.89%	6.67%	15.52%	3.33%	3.70%	8.00%	6.83%

The missing CPT and RVU values for each of the procedures were replaced with CPT codes and RVU values from identical procedure descriptions in the database. The missing data can be attributed to a failure to close out the SIDR or SADR for a surgical procedure which would prevent the workload from being captured in M2.

After organization of the data, monthly totals of RVUs and In-room surgical time were collected for each service. These totals were used in the calculation of the new OR metrics. The data were combined into months because all EASIV data used in the calculations were reported monthly as well as utilization rates and assigned hours found in S3.

There were no missing data in the EASIV data pull; however, two new variables were created with information from the data pull. The first was hours per month of all support staff for each month during the duration of the study. This was calculated by adding the monthly total of support staff FTEs (including nurses, OR techs, and administrators) and multiplying that number by 168 hours per FTE. The second new variable was adjusted available salary for providers under the A MEPRS codes. EASIV does not differentiate between inpatient workload generated in the OR and inpatient workload generated on the units. It only reports available salary expenses per 4th level functional cost codes (same as MEPRS codes). In order to calculate the available salary for providers in the actual OR, the total in-room time (min) was taken from S3, divided by 60 min/hour, and then divided by 168 FTEs per hour. This adjusted available FTE was multiplied by the average salary per A MEPRS code per month in order to calculate the adjusted available salary per month.

Ethical considerations of data collection.

No information containing patient identifying information was used in the study. All data pulled excluded patient identifying information.

Metrics.

After organization of the data, the second part of the project developed two different types of alternative metrics for evaluating OR performance. These include productivity metrics and cost accounting metrics. Both of these types of metrics are workload based. See Appendix D for a list of the metrics and calculation methodology.

The productivity metrics measure unit of workload (RVU) per a unit of time. As stated in the literature review, RVUs provide and objective means for evaluating physician productivity, which can be carried over to evaluating the overall productivity of a surgical service. This study will examine three possible workload based metrics.

The first productivity metric is RVU per Service Hour. This metric is calculated by dividing the total monthly surgical workload (RVU) for each surgical service by the total in-room time in hours. Resnick, Corrigan, Mullen, and Kaiser used this metric design in their 2005 study to outline differences in productivity among surgical specialties. This metric is useful for the identification of services that contribute more to the hospital bottom line per surgical hour. This metric also provides quantitative data to evaluate the efficiency of surgeons within the same surgical service.

The second productivity metric is RVU per Assigned Hour. This metric is calculated by dividing the total monthly surgical workload (RVU) for each surgical service by the total number of hours assigned to each surgical service in S3. Unlike the first metric, this metric takes into consideration the unused time that a service is allocated through block scheduling. This metric reports how productive and efficient surgical services are being with their allocated blocks of time. As services utilize more of their assigned hours, the value of this metric will become closer to being equal with RVU per Service Hour.

The third productivity metric is RVU per Staffed Hour. This metric is calculated by dividing the monthly surgical workload (RVU) for each surgical service by the OR suite's assigned number of support staff hours from EASIV. Services are assigned a percentage of support staff hours based off of the percentage of the total block hours they are allocated on a monthly basis. This metric accounts for all hours of support staff members working in the OR suite.

Cost accounting metrics use RVUs as a objective means to calculate the cost per unit of workload. Glass and Anderson (2002c) suggest that medical practices use RVU cost accounting to figure out the average amount they are paying their providers per work RVU by dividing the sum of the total provider compensation expenses by the sum of the total work RVU. The first cost accounting metric, Provider Cost per RVU uses this design. This metric is calculated by dividing the total monthly available salary expense from EASIV by the monthly surgical workload (RVU) for each service. The total monthly available salary is a sum of the available salary for B MEPRS codes and the adjusted available salary for A MEPRS codes for each surgical service.

The second cost accounting metric, Total Costs per RVU, is a combination of two different metrics. Glass and Anderson (2002c) suggest using a Blended Cost per RVU which would account for all three RVU components (work, practice expense, and malpractice) and the costs associated with them (provider compensation, practice expense, and malpractice expense). This formula does not work for RACH because the AMEDD does not use Malpractice RVUs or PE RUVs in the ambulatory section of PBAM for performance earnings or targets. PBAM uses Simple RVUs. Viapiano and Ward (2000) suggest looking at revenues minus expenses when using RVU cost accounting. Although each surgical service's costs (as calculated in this metric) outnumber the revenues, accounting for the revenues the surgical services make is important when comparing costs. Since the PPS rates are different among all product lines and there is a different amount of workload for each service, the revenues (performance earnings on PBAM) will be different for each service. In this study, Total Costs per RVU is calculated by dividing total costs by total RVUs for each surgical service. Total costs for each surgical service include a percentage of the total monthly expense costs from EASIV and the total monthly available salary costs minus the monthly performance earnings. Services are assigned a percentage of the total monthly expense costs based off of the percentage of the total block hours they are allocated in the OR. Total monthly expense costs include direct expenses, ancillary step-down costs, and administrative step-down costs that are assigned to the OR. Performance earnings were included in this formula to represent revenues and to account for the fact that different services earn different PPS rates and contribute to the hospital margin at different levels. The same PPS rate was applied to A and B MEPRS codes for each surgical service.

The utilization metric was downloaded directly from S3. Each month, S3 reports the utilization rate for each surgical service as well as the OR as a whole. The utilization rate is determined by dividing the total number of hours used by a surgical service by the number of hours assigned to that service in block scheduling.

After the metrics were calculated, a statistical analysis of the data was conducted as described below to detect differences among the surgical services in all six of the metrics. Following that, each metric was compared to each other to see if individual surgical services rank the same across the different metrics. The utilization metric is included in the statistical analysis part of the study to determine if there is a statistically significant difference among the services in terms of utilization.

Variables

Dependent Variable #1 – RVU per Surgical Hour

Dependent Variable #2 – RVU per Assigned Hour

Dependent Variable #3 – RVU per Staffed Hour

Dependent Variable #4 – Provider Cost per RVU

Dependent Variable #5 – Total Cost per RVU

Dependent Variable #6 – Utilization Rate

Independent Variable – Surgical Service

Statistical Analysis

All statistical analysis will be done using PASW 17 (formerly SPSS Statistics). The Microsoft Excel Data Analysis Tool Pack was used to organize the three data bases and calculate averages and rank. An ANOVA test was used to see if there was a statistically significant difference among each of the surgical services in relation to each dependent variable (metric). Significance for this study is set at $\alpha = 0.05$. Finally, the services were ranked to determine if ranks change depending on the metric utilized.

Results

Productivity Metrics

A visual inspection of histograms of the data showed that most of the data are normally distributed. Table 3 outlines monthly averages for each of the metric components by surgical service. ORTHO had the highest average inputs (hours and costs), but OBGYN had the highest average output (RVU).

Table 3.

Surgical Service Descriptive Statistics

Service	Mean RVU	Mean Staffed Hours	Mean Surgical Hours	Mean Surgeon Salary Costs	Mean Total Costs	Mean Utilization
GEN SURG	245	86	48	4,385	95,888	54%
OPHTHO	44	14	4	512	15,755	40%
ENT	112	49	27	1,938	58,558	66%
URO	128	33	22	1,906	37,296	64%
OBGYN	377	60	41	3,157	58,806	45%
ORTHO	268	120	65	8,046	138,424	58%
POD	19	14	5	397	18,155	46%
ORAL	13	11	4	415	16,750	24%

Note. Means are monthly averages from December 2007 to December 2008.

The descriptive statistics in Table 4 highlight the mean and standard deviation for each of the productivity based metrics. OPHTHO has the highest mean RVU per Surgical Hour, followed by OBGYN. OBGYN has the highest mean RVU per Assigned Hour and RVU per Staffed Hour, followed by URO. POD and ORAL have the lowest means for all three of the metrics.

Table 4.

Productivity Metric Descriptive Statistics

		Productivity Metric					
		RVU per Surgical Hour		RVU per Assigned Hour		RVU per Staffed Hour	
SERVICE	N	MEAN	SD	MEAN	SD	MEAN	SD
GEN SURG	13	5.12	0.68	2.92	0.67	0.28	0.08
OPHTHO	13	11.55	2.11	3.27	0.89	0.31	0.08
ENT	13	4.27	0.86	2.31	0.51	0.22	0.07
URO	13	5.71	0.73	4.03	1.20	0.40	0.19
OBGYN	13	9.18	0.94	6.45	1.53	0.62	0.16
ORTHO	13	4.16	0.35	2.32	0.49	0.22	0.06
POD	6	3.45	0.66	1.40	0.94	0.12	0.09
ORAL	11	3.89	1.96	1.16	1.36	0.09	0.10

The first metric analyzed was RVU per Surgical Hour. An ANOVA was used to determine if there was a difference among the performance of the different surgical services in regard to RVU per Surgical Hour. There is a statistically significant difference between at least two of the means as analyzed by this metric, $F(7, 87) = 74.51$, $p < 0.01$. Therefore, we reject the null hypothesis that the means for RVU per Surgical Hour are equal for all services. According to the literature review, this would be the expected finding because individual services contribute different amounts to the hospital bottom line, so one can expect a difference in the number of RVUs produced by different services in the same amount of time.

Since the ANOVA was statistically significant, a post hoc Tamhane's T2 Test was used to determine the specific differences between each of the surgical services. Tamhane's T2 was chosen because the variances are not homogeneous, Levene $(7, 87) = 4.94$, $p < 0.01$. Table 5 outlines the significant differences between each of the eight surgical services. OPHTHO (mean=11.55) and OBGYN (mean=9.88) had significantly higher average RVU per Surgical

Hour than the remaining six services. URO performed significantly better than ENT, ORTHO, and POD, but there was not a statistically significant difference between URO and GEN SURG.

Table 5.

RVU per Surgical Hour Tamhane's Results

Service	POD	ORAL	ORTHO	ENT	GEN SURG	URO	OBGYN	OPHTHO
	Significance of the Difference of the Means of Surgical Services							
POD								
ORAL	1.000							
ORTHO	0.728	1.000						
ENT	0.682	1.000	1.000					
GEN SURG	**0.013**	0.751	**0.007**	0.265				
URO	**0.001**	0.169	**0.000**	**0.003**	0.674			
OBGYN	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**		
OPHTHO	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	0.050	

Note. Significance is defined as $p < 0.05$, and significant p values are indicated by bold font.

The next metric analyzed was RVU per Assigned Hour. An ANOVA was used to determine if there was a difference among the performance of the different surgical services in regard to RVU per Assigned Hour. There is a statistically significant difference between at least two of the means as analyzed by this metric, $F(7, 87) = 32.60$, $p < 0.01$. Therefore, we reject the null hypothesis that the means for RVU per Assigned Hour are equal for all services. This was the expected result because the metric is still looking at surgical productivity per unit of time.

Since the ANOVA was statistically significant, a post hoc Tamhane's T2 Test was run to determine the specific differences between each of the surgical services. The Tamhane's T2 was chosen because the variances are not homogeneous, Levene $(7, 87) = 3.30$, $p < 0.01$. Table 6 outlines the significant differences between each of the eight surgical services. OBGYN (mean =

6.45) was more productive per assigned hour than every other service. URO performed significantly better than POD, ORAL, ORTHO, and ENT.

Table 6.

RVU per Assigned Hour Tamhane's Results

	Significance of the Difference of the Means of Surgical Services							
Service	POD	ORAL	ORTHO	ENT	GEN SURG	URO	OBGYN	OPHTHO
POD								
ORAL	1.000							
ORTHO	0.834	0.411						
ENT	0.845	0.428	1.000					
GEN SURG	0.207	**0.041**	0.362	0.357				
URO	**0.006**	**0.001**	**0.006**	**0.006**	0.224			
OBGYN	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.005**		
OPHTHO	0.068	**0.011**	0.089	0.087	1.000	0.900	**0.000**	

Note. Significance is defined as $p < 0.05$, and significant p values are indicated by bold font.

The next metric analyzed was RVU per Staffed Hour. An ANOVA was used to determine if there was a difference among the performance of the different surgical services in regard to RVU per Staffed Hour. There is a statistically significant difference between at least two of the means as analyzed by this metric, $F(7, 87) = 25.95$, $p < 0.01$. Therefore, we reject the null hypothesis that the means for RVU per Staffed Hour are equal for all services. This is also the expected result because it is a productivity based metric.

Since the ANOVA was statistically significant, a post hoc Tamhane's T2 Test was run to determine the specific differences between each of the surgical services. The Tamhane's T2 was chosen because the variances are not homogeneous, Levene $(7, 87) = 3.31$, $p < 0.01$. Table 7 outlines the significant differences between each of the eight surgical services. OBGYN (mean = 0.62) was significantly more productive per staffed hour than every other surgical service except URO. The ranking of services from largest to smallest mean for this metric mirrors that of the RVU per Assigned Hour. This is expected because the support staff hours were allocated to services based off of assigned hours in the OR. The difference on what these two metrics evaluate will be discussed in the next section.

Table 7.

RVU per Staffed Hour Tamhane's Results

Service	POD	ORAL	ORTHO	ENT	GEN SURG	URO	OBGYN	OPHTHO
	Significance of the Difference of the Means of Surgical Services							
POD								
ORAL	1.000							
ORTHO	0.512	**0.049**						
ENT	0.552	0.063	1.000					
GEN SURG	0.079	**0.002**	0.671	0.708				
URO	**0.007**	**0.001**	0.129	0.123	0.722			
OBGYN	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	0.120		
OPHTHO	**0.030**	**0.000**	0.088	0.111	1.000	0.967	**0.000**	

Note. Significance is defined as $p < 0.05$, and significant p values are indicated by bold font.

Cost Accounting Metrics

The descriptive statistics in Table 8 highlight the mean and standard deviation for each of the cost accounting metrics. The individual surgical service's monthly salary costs per unit of workload generated in the OR were used as the data points for Surgeon Cost per RVU. The individual surgical service's total monthly cost per unit of workload generated in the OR were used as data points for Total Cost per RVU. Total costs include a sum of all direct, step-down, and salary costs minus the performance earnings. ORAL was not included in the Total Cost per RVU portion of the study because the MTF does not receive any performance earnings from workload generated under the Dental inpatient and outpatient codes (CAA5 and ABFA). Also

POD was excluded from this portion of the study the second time the data was analyzed because POD's mean Total Cost per RVU was more than four times greater than any of the other services which resulted in less significant results in the post hoc study.

Table 8.

Cost Accounting Metric Descriptive Statistics

		Cost Accounting Metric			
		Provider Cost per RVU		Total Cost per RVU	
SERVICE	N	MEAN	SD	MEAN	SD
GEN SURG	13	18.13	7.44	413.68	110.6
OPHTHO	13	12.47	10.88	369.88	116.29
ENT	13	17.65	4.62	523.26	140.88
URO	13	14.00	5.77	318.74	169.51
OBGYN	13	8.15	3.43	157.62	45.55
ORTHO	13	29.24	13.43	530.44	106.54
POD	6	33.32	26.28	-	-
ORAL	11	19.57	13.77	-	-

Note. POD and ORAL were excluded from Total Cost per RVU.

The first cost accounting metric analyzed was the Provider Cost per RVU. An ANOVA was used to determine if there was a difference among the performance of the different surgical services in regard to Provider Cost per RVU. There is a statistically significant difference between at least two of the means as analyzed by this metric, $F\ (7, 87) = 5.91$, $p < 0.01$. Therefore, we reject the null hypothesis that the means for Provider Cost per RVU are equal for all services. This is the expected result because the denominator in the equation is based on workload which is different for every service.

Since the ANOVA was statistically significant, a post hoc Tamhane's T2 Test was run to determine the specific differences between each of the surgical services. The Tamhane's T2 was chosen because the variances are not homogeneous, Levene (7, 87) = 6.42, $p < 0.01$. Table 9 outlines the significant differences between each of the eight surgical services. OBGYN (mean = 8.15) was significantly more cost efficient than ORTHO, ENT, and GEN SURG. URO was significantly more cost efficient than ORTHO.

Table 9.

Surgeon Cost per RVU Tamhane's Results

	Significance of the Difference of the Means of Surgical Services							
Service	POD	ORAL	ORTHO	ENT	GEN SURG	URO	OBGYN	OPHTHO
POD								
ORAL	1.000							
ORTHO	1.000	0.944						
ENT	0.998	1.000	0.250					
GEN SURG	0.999	1.000	0.389	1.000				
URO	0.981	0.999	**0.046**	0.925	0.978			
OBGYN	0.852	0.453	**0.003**	**0.000**	**0.011**	0.138		
OPHTHO	0.964	0.996	0.053	0.982	0.983	1.000	0.998	

Note. Significance is defined as $p < 0.05$, and significant p values are indicated by bold font.

The final cost accounting metric analyzed was the Total Costs per RVU. An ANOVA was used to determine if there was a difference among the performance of the different surgical services in regard to Total Cost per RVU. There is a statistically significant difference between at least two of the means as analyzed by this metric, F (5, 72) = 17.31, $p < 0.01$. Therefore, we reject the null hypothesis that the means for Total Cost per RVU are equal for all services. This is the expected result because the denominator in the equation is based on workload and the PPS rate is different for each of the services.

Since the ANOVA was statistically significant, a post hoc Tamhane's T2 Test was run to determine the specific differences between each of the surgical services. The Tamhane's T2 was chosen because the variances are not homogeneous, Levene (5, 72) = 3.2, $p = 0.012$. Table 10 outlines the significant differences between each of the six surgical services analyzed. The most cost efficient service was OBGYN (mean = 157.62) which had a statistically significant Total Cost per RVU value lower than all services except URO. URO was significantly more cost efficient than ORTHO and ENT.

Table 10.

Total Cost per RVU Tamhane's Results

	Significance of the Difference of the Means of Surgical Services					
Service	ORTHO	ENT	GEN SURG	URO	OBGYN	OPHTHO
ORTHO						
ENT	1.000					
GEN SURG	0.158	0.439				
URO	**0.016**	**0.041**	0.813			
OBGYN	**0.000**	**0.000**	**0.000**	0.076		
OPHTHO	**0.018**	0.086	0.998	0.999	**0.000**	

Note. Significance is defined as $p < 0.05$, and significant p values are indicated by bold font.

Utilization Metrics

The utilization metric from the S3 database was analyzed with an ANOVA to see if there was a difference among the services in the percent of OR time they used in their assigned blocks of time each month. Table 11 outlines the descriptive statistics for the utilization metric. URO and ENT have the highest average utilization rates.

Table11.

Utilization Metric Descriptive Statistics

	Utilization Metric		
SERVICE	N	MEAN	SD
GEN SURG	13	53.70	15.41
OPHTHO	13	39.85	11.9
ENT	13	65.85	11.35
URO	13	63.92	15.87
OBGYN	13	44.62	10.58
ORTHO	13	58.08	12.69
POD	6	46.00	21.65
ORAL	11	24.00	31.68

An ANOVA was used to determine if there was a difference among the performance of the different surgical services in regard to Utilization. There is a statistically significant difference between at least two of the means as analyzed by this metric, $F(7, 87) = 8.05$, $p < 0.01$. Therefore, we reject the null hypothesis that the means for utilization are equal for all services. A post hoc Tamhane's T2 Test was run to determine the specific differences between each of the surgical services. The Tamhane's T2 was chosen because the variances are not homogeneous, Levene $(7, 87) = 3.75$, $p < 0.01$. Table 12 outlines the significant differences between each of the eight surgical services. ENT (mean = 65.85) had a significantly higher utilization rate than ORAL, OBGYN and OPHTHO. URO had a significantly higher utilization rate than OBGYN and OPHTHO.

Table 12.

Utilization Tamhane's Results

Service	POD	ORAL	ORTHO	ENT	GEN SURG	URO	OBGYN	OPHTHO
	Significance of the Difference of the Means of Surgical Services							
POD								
ORAL	0.965							
ORTHO	1.000	0.141						
ENT	0.893	**0.035**	0.965					
GEN SURG	1.000	0.311	1.000	0.598				
URO	0.961	0.053	1.000	1.000	0.960			
OBGYN	1.000	0.832	0.186	**0.001**	0.938	**0.041**		
OPHTHO	1.000	0.986	**0.026**	**0.000**	0.390	**0.007**	1.000	

Note. Significance is defined as $p < 0.05$, and significant p values are indicated by bold font.

In order to compare utilization with the newly developed metrics, the mean values from each metric were used to rank the surgical services. Productivity and utilization metrics were ranked from lowest to highest and cost accounting metrics were ranked from highest to lowest. OBGYN, OPHTHO, and URO ranked in the top three for all metrics except utilization. URO is the only one of these three services that ranked in the top three for utilization. OBGYN and OPHTHO ranked in the bottom three for utilization. Table 13 summarizes the ranking of the remaining surgical services.

Table 13.

Comparison of Surgical Service Rankings

	Metric					
Rank	RVU per Surgical Hour	RVU per Assigned Hour	RVU per Staffed Hour	Surgeon Cost per RVU	Total Cost per RVU	Utilization
1	OPHTHO	OBGYN	OBGYN	OBGYN	OBGYN	ENT
2	OBGYN	URO	URO	OPHTHO	URO	URO
3	URO	OPHTHO	OPHTHO	URO	OPHTHO	ORTHO
4	GEN SURG	GEN SURG	GEN SURG	ENT	GEN SURG	GEN SURG
5	ENT	ORTHO	ORTHO	GEN SURG	ENT	POD
6	ORTHO	ENT	ENT	ORAL	ORTHO	OBGYN
7	ORAL	POD	POD	ORTHO	-	OPTHO
8	POD	ORAL	ORAL	POD	-	ORAL

Note. The ranking goes from 1 as the highest to 8 as the lowest.

Discussion

The productivity metrics are useful tools for managers to use to evaluate the overall performance of surgical services and the OR as a whole. They are all based on workload which is how MTFs are evaluated under PBAM. The RVU per Surgical Hour is useful because it encompasses all inpatient and outpatient RVUs generated by providers within a service. Product lines in the ambulatory section of PBAM are only evaluated using outpatient RVUs. The benchmarks and performance earnings are calculated off of outpatient workload, including SDS. Until recently, PBAM did not compensate for inpatient workload. As a result, the metrics being used at RACH did not take into account inpatient workload. This metric provides a complete picture of the productivity of the surgical services in the OR. OR managers can use this metric not only to evaluate surgical services, but also to evaluate individual providers within a surgical service. Over time, OR managers can track the trends within a service and develop internal benchmarks for productivity in the OR. OR managers can also use this metric to see which services contribute the most to the bottom line and try to schedule them more OR hours to increase revenues for RACH.

In this study, the top two services that significantly produce the most workload per hour of work were OPHTHO and OBGYN. One explanation for their performance in this metric is that the majority of their case loads consist of procedures with high RVU values that can be completed in a relatively short period of time. Most OPHTHO procedures generate 7.25 RVUs and are completed in less than an hour. The majority of OBGYN procedures generate between 15.95 and 17.4 RVUs and are completed is less than 90 minutes. However, when compared to utilization rates, neither of these services is ranked above number six. One of the reasons OPHTHO has a low utilization rate is that the post-operative recovery section is limited in the number of patients that they can process in a given day.

The RVU per Assigned Hour metric is useful for evaluating services, but is not intended to be used for evaluating individual surgeons. It measures how efficiently a service is using the block time allocated to them. Unlike RVU per Surgical Hour, this metric takes into account unused time in the OR which can have an impact on the service's overall productivity. As services become more efficient at using their allocated time blocks, this metric will move closer to equaling the RVU per Surgical Hour metric. Over time, OR managers can use this metric to track performance and develop benchmarks for individual surgical services. Compiling all services into an overall OR RVU per Assigned Hour would be a good metric to be used to compare RACH with similar sized MTFs. Like utilization, this metric takes into account available hours, but it also accounts for case mix index and the overall workload of the OR, not just time. In this study, the top three services were OBGYN, URO, and OPHTHO. There are two reasons OBGYN may be the leader in this metric. The first is that they typically perform high RVU generating procedures in a relatively short amount of time. The second is that they tend to perform more unscheduled or emergency cases outside the constraints of their allocated block time that count toward their total productivity.

When compared to Utilization, only URO is ranked in the top three. This is very important because out of all of the metrics, RVU per Assigned Hour is the one that is the most similar to Utilization. RVU per Assigned Hour measures the workload generated in a specific time period. Utilization measures the time spent working in a specific time period. The differences in the rankings show that just because a service is spending more time in the OR does not mean that they are contributing more workload to the organization.

The surgical services performed almost the same in the RVU per Staffed Hour as they did in the RVU per Assigned Hour. This is due to the fact that the amount of staffed hours allocated to each service in the calculation of this metric was based off of assigned hours of block time in the surgical schedule. The same factors affected the results of both metrics. RVU per Assigned Hour is a better metric to use for evaluating services because it analyzes variables that individual services have control over. A better use for RVU per Staffed Hour would be to calculate the total number of RVUs from all services per staffed hour. This would prove a useful tool for OR managers in analyzing staffing levels for the department as a whole. Ideally, OR managers could compare this metric with like facilities to see if the OR is over or understaffed based off of productivity.

Outside the AMEDD, RVUs are increasingly being used for cost accounting and analysis by practice managers. Medical groups look at the cost per individual RVU component or total cost per RVU. This study looked at the Surgeon Cost per RVU, which resembles the Cost per RVU_W from the literature review. This metric allows OR managers to evaluate services on the average amount they are paying their providers per RVU, or they can look at individual providers. If there is a drastic difference between two similarly paid providers in the same service, the OR manager would have to investigate the root cause of that discrepancy. One explanation could be that the providers are not logging their time correctly in DMHRSi. This would cause too much or too little of their salary to be allocated to the MEPRS codes assigned to work in the OR. Another explanation could be that one provider generates more workload than the other, making the denominator larger and the cost per RVU lower. In this study, OBGYN, OPHTHO, and URO were ranked in the top three. The most probable cause for this is that they create more workload in less time than other services. This would give them lower salary amounts for time spent in the OR and higher RVU amounts. Neither OBGYN nor OPHTHO ranked above in the top three for Utilization. This is interesting because they are ranked in the top three as the most productive per hour and most cost efficient services.

The final metric is Total Cost per RVU. This metric would be appropriate to use to evaluate surgical services, but would probably more beneficial to use to evaluate the OR at a departmental level. Although the metric takes performance earnings into account, the services have little control over the direct and step-down costs assigned to the OR through EASIV. The costs are allocated to the different surgical services based on assigned OR time, so the results are similar to the productivity metrics that use assigned time in their equations. OBGYN is the most cost efficient service according to this metric, followed by URO and OPHTHO. URO is the only service that ranks in the top three for utilization. This would be an easy metric for OR managers to evaluate at the aggregate level on a monthly basis to track trends in increased or decreased cost of operations.

Recommendations

The purpose of this study was to develop new productivity metrics for the OR, analyze these metrics to see if they could be used to detect significant differences in the performance of individual surgical services, and compare these metrics to the utilization metric that was currently being used. Now that the metrics have been developed and proven to be effective, where do we go from here?

One recommendation would be to use these metrics to start trend analyses on the different services within the facility so that future benchmarks can be established. The previous section discussed the possible uses for each of the metrics as a means to evaluate at the provider, service, and department level. An example of a benchmarking tool that can be adapted to fit the needs of the OR is the RVU/Provider/Day standard that is found in Appendix B. An adaptation of this to evaluate surgical services could be RVU/Service/Month in the OR. This is just the Surgical RVU per Hour benchmark OR managers set multiplied by the amount of assigned hours they expect that service to complete each month.

Before OR managers can use these tools, they should ensure that the data is as accurate as possible. This includes correct time keeping in DMHRSi so that inpatient and outpatient data are correct for cost accounting, closing out the SIDR and SADR so the service gets credit for workload in M2, and recording surgical time correctly in the OR records so that individual surgeon's productivity ratios are accurate. Also, OR managers should be able to understand the variables that affect each of these metrics so that they can figure out the root cause for changes in trends or deviations from benchmarks.

In the future, it would be useful if all MTFs across the AMEDD utilized productivity metrics to evaluate overall performance in the OR. This would allow like sized facilities to develop benchmarks over time and align the performance focus of the OR with the performance objectives that services are accountable for in PBAM.

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Appendix A

Outpatient Product Line Descriptions

Product Line	Description	MEPRS (3rd level)	Clinical Service
DERM	Dermatology	BAP	Dermatology Clinic
ENT	Otolaryngology	BBF	Otolaryngology Clinic
ER	Emergency Room	BIA	Emergency Medical Clinic
IM SUB	Internal Medicine Sub-Speciality	BAB	Allergy Clinic
IM SUB	Internal Medicine Sub-Speciality	BAC	Cardiology Clinic
IM SUB	Internal Medicine Sub-Speciality	BAE	Diabetic Clinic
IM SUB	Internal Medicine Sub-Speciality	BAF	Endocrinology (Metabolism) Clinic
IM SUB	Internal Medicine Sub-Speciality	BAG	Gastroenterology Clinic
IM SUB	Internal Medicine Sub-Speciality	BAH	Hematology Clinic
IM SUB	Internal Medicine Sub-Speciality	BAJ	Nephrology Clinic
IM SUB	Internal Medicine Sub-Speciality	BAK	Neurology Clinic
IM SUB	Internal Medicine Sub-Speciality	BAL	Outpatient Nutrition Clinic
IM SUB	Internal Medicine Sub-Speciality	BAM	Oncology Clinic
IM SUB	Internal Medicine Sub-Speciality	BAN	Pulmonary Disease Clinic
IM SUB	Internal Medicine Sub-Speciality	BAO	Rheumatology Clinic
IM SUB	Internal Medicine Sub-Speciality	BAQ	Infectious Disease Clinic
IM SUB	Internal Medicine Sub-Speciality	BAS	Radiation Therapy Clinic
IM SUB	Internal Medicine Sub-Speciality	BAT	Bone Marrow Transplant Clinic
IM SUB	Internal Medicine Sub-Speciality	BAU	Genetics Clinic (Keesler Only)
IM SUB	Internal Medicine Sub-Speciality	BAV	Hyperbaric Medicine
MH	Mental Health	BFA	Psychiatry Clinic
MH	Mental Health	BFB	Psychology Clinic
MH	Mental Health	BFC	Child Guidance Clinic
MH	Mental Health	BFD	Mental Health Clinic
MH	Mental Health	BFE	Social Work Clinic
MH	Mental Health	BFF	Substance Abuse Clinic

(table continues)

Appendix A

Outpatient Product Line Descriptions

Product Line	Description	MEPRS (3rd level)	Clinical Service
OB	Obstetrics	BCA	Family Planning Clinic
OB	Obstetrics	BCB	Obstetrics/Gynecology Clinic
OB	Obstetrics	BCD	Breast Care Clinic
OPTOM	Optometry	BBD	Ophthalmology Clinic
OPTOM	Optometry	BHC	Optometry Clinic
ORTHO	Orthopedics	BEA	Orthopedic Clinic
ORTHO	Orthopedics	BEB	Cast Clinic
ORTHO	Orthopedics	BEC	Hand Surgery Clinic
ORTHO	Orthopedics	BED	Chiropractic Clinic
ORTHO	Orthopedics	BEE	Orthotic Laboratory
ORTHO	Orthopedics	BEF	Podiatry Clinic
ORTHO	Orthopedics	BEZ	Orthopedic Care NEC
ORTHO	Orthopedics	BLA	Physical Therapy Clinic
ORTHO	Orthopedics	BLB	Occupation Therapy Clinic
OTHER	OTHER	BAI	Hypertension Clinic
OTHER	OTHER	BAR	Physical Medicine Clinic
OTHER	OTHER	BAX	Medical Clinics Cost Pool
OTHER	OTHER	BAZ	Medical Care NEC
OTHER	OTHER	BB	Surgical Care
OTHER	OTHER	BBL	Pain Management Clinic
OTHER	OTHER	BBM	Vascular and Interventional Radiology Clinic
OTHER	OTHER	BBX	Surgical Clinics Cost Pool
OTHER	OTHER	BCX	OB/GYN Clinics Cost Pool
OTHER	OTHER	BCZ	OB/GYN Care NEC
OTHER	OTHER	BDZ	Pediatric Care NEC
OTHER	OTHER	BEX	Orthopedic Care Cost Pool
OTHER	OTHER	BFX	Psychiatric and Mental Health Cost Pool
OTHER	OTHER	BFZ	Psychiatric Clinics NEC
OTHER	OTHER	BHD	Audiology Clinic
OTHER	OTHER	BHE	Speech Pathology Clinic
OTHER	OTHER	BHF	Community Health Clinic
OTHER	OTHER	BHG	Occupational Health Clinic
OTHER	OTHER	BIX	Emergency Medical Cost Pool
OTHER	OTHER	BIZ	Emergency Medical Care NEC
OTHER	OTHER	BJZ	Flight Medicine NEC

(table continues)

Appendix A

Outpatient Product Line Descriptions

Product Line	Description	MEPRS (3rd level)	Clinical Service
OTHER	OTHER	BKX	Underseas Medicine Clinic Cost Pool
OTHER	OTHER	BKZ	Underseas Medicine NEC
OTHER	OTHER	BLC	Neuromuscularskeletal screening clinic
OTHER	OTHER	BLX	Rehabilitative Ambulatory Services Cost Pool
OTHER	OTHER	BLZ	Rehabilitative Ambulatory Services
PC	Primary Care	BAA	Internal Medicine Clinic
PC	Primary Care	BDA	Pediatric Clinic
PC	Primary Care	BDB	Adolescent Clinic
PC	Primary Care	BDC	Well-Baby Clinic
PC	Primary Care	BDX	Pediatric Clinics Cost Pool
PC	Primary Care	BGA	Family Practice Clinic
PC	Primary Care	BGX	Family Practice Cost Pool
PC	Primary Care	BGZ	Family Practice NEC
PC	Primary Care	BHA	Primary Care Clinics
PC	Primary Care	BHB	Medical Examination Clinic
PC	Primary Care	BHH	Tricare Clinic
PC	Primary Care	BHI	Immediate Care Clinic
PC	Primary Care	BHX	Cost Pool
PC	Primary Care	BHZ	Primary Medical Care Clinics NEC
PC	Primary Care	BJA	Flight Medicine Clinic
PC	Primary Care	BJX	Flight Medicine Cost Pool
PC	Primary Care	BKA	Underseas Medicine Clinic
SURG	Surgery	BBA	General Surgery Clinic
SURG SUB	Surgical Sub-Specialty	BBB	Cardiovascular & Thoracic Surgery Clinic
SURG SUB	Surgical Sub-Specialty	BBC	Neurosurgery Clinic
SURG SUB	Surgical Sub-Specialty	BBE	Organ Transplant Clinic
SURG SUB	Surgical Sub-Specialty	BBG	Plastic Surgery Clinic
SURG SUB	Surgical Sub-Specialty	BBH	Proctology Clinic
SURG SUB	Surgical Sub-Specialty	BBI	Urology Clinic
SURG SUB	Surgical Sub-Specialty	BBJ	Pediatric Surgery Clinic
SURG SUB	Surgical Sub-Specialty	BBK	Peripheral Vascular Surgery Clinic
SURG SUB	Surgical Sub-Specialty	BBZ	Surgical Care NEC

RVU/Provider/Day FY 2009 Standards

DEPARTMENT OF THE ARMY
HEADQUARTERS, U. S. ARMY MEDICAL COMMAND
2050 WORTH ROAD, SUITE 10
FORT SAM HOUSTON, TEXAS 78234-6010

REPLY TO
ATTENTION OF

MCHO-CL-C

MEMORANDUM FOR THE Commanders, Major Subordinate Commands, U.S. Army Medical Command

SUBJECT: Outpatient Relative Value Unit goals for the Performance Based Adjustment Model

1. Attached is the table containing the outpatient Relative Value Unit (RVU) goals the U.S. Army Medical Command (MEDCOM) will use for the Fiscal Year 2009 (FY09) Performance Based Adjustment Model (PBAM) and the FY10-11 business planning process. These efficiency goals, assigned by 3-digit Medical Expense and Reporting System work center codes, indicate the number of RVUs a provider should be able to produce in a full clinic day assuming they have the appropriate number of examination/treatment rooms, equipment, and adequate ancillary support.

2. The goals are based on data from the Medical Group Management Association, historical performance by specialty, and input from the Specialty Consultants to the Surgeon General. Under the current system, many specialty goals have reached their maximum value and should not change. Other specialties have intermediate goals based on historical performance and will incrementally change annually until reaching the maximum value.

3. For specialties unable to achieve the RVU goal, efforts should be made to identify and rectify any condition that impedes provider efficiency. However, quality of care should never be compromised in order to increase productivity.

4. Point of contact for this action is Mr. Michael O'Brien, Clinical Services Division, Commercial 210-221-7109, DSN 471-7109; email Michael.OBrien@amedd.army.mil.

Encl
as

WILLIAM THRESHER
SES
Chief of Staff

Appendix 2

RVU/Provider/Day FY 2009 Standards

Fiscal Year 2009
Performance Based Asaassment Model
RVU/Providar/Day Goals

MEPRS Code	Description	FY09 PBAM Goal	FY10-11 Business Plan
BAA	Intarnal Medicine	16.04	21.04
BAB	Allergy	19.33	14.56
BAC	Cardiology	14.77	14.77
BAE	Diabetic	3.95	3.95
BAE	Endocrine	13.56	14.56
BAC	Gastroenterology	21.94	21.94
BAJ	Nephrology	10.60	14.50
BAK	Neurology	18.66	15.66
BAL	Outpatient Nutrition	4.57	18.60
BAM	Oncology	9.68	18.60
BAN	Pulmonary	12.02	12.42
BAO	Rheumatology	15.74	3.74
BAP	Dermatology	27.92	22.42
BAQ	Infectious Disease	9.05	18.05
BAR	Phyaical Medicine	16.64	14.56
BAS	Radiation Therapy	16.64	14.53
BBA	General Surgery	16.65	14.56
BBC	Neurosurgery	9.62	14.56
BBN	Ophthalmology	27.92	27.92
BBE	Organ Transplant	9.65	14.55
BBF	ENT	24.63	24.63
BBC	Plastic Surgery	18.66	14.56
BBI	Urology	19.38	18.08
BBK	Vascular Surgery	13.72	13.72
BBL	Pain Managament Clinic	23.11	23.11
BBN	Burn	9.68	3.74
BCB	GYN General	22.02	14.56
BCC	Obstetrics	BCB	BCB
BCD	Breast Care	9.60	14.50
BDA	Pediatrics, General	16.84	18.60
BDB	Peds/Adolescent	16.64	14.56
BDC	Well Baby	27.92	14.56
BEA	Orthopedics, Ganaral	18.66	14.55
B[illegible]C	Orthopedics, Hand	12.02	18.06
BED	Chiropractic	22.28	22.28
BEF	Podiatry	18.00	18.00
BFA	Paychiatry	16.00	18.00
BFB	Psychology	10.64	10.64
BFE	Child Guidance	11.87	18.27
BFD	Mental Health	15.82	14.56
BFE	Social Work	9.69	9.59
BFE	Substance Abuse	7.17	7.17
BGA	Family Practice	18.60	14.56
BHA	Primary Care	18.27	18.27
BHB	Medical Examination	18.66	18.66
BHC	Optometry	19.56	18.65
BHD	Audiology	6.83	9.59
BHF	Speech Pathology	5.43	9.53
BHF	Community Health	18.27	18.27
BHG	Occupational Health	9.68	18.60
BHI	Immediate Care	17.16	18.66
BIA	Emergency Medicine	20.04	10.04
BJA	Flight Medicine	18.60	14.50
BLA	Phyaical Therapy	17.10	18.00
BLB	Occupational Therapy	10.33	14.56

Enclosure 1

Appendix 3

Inpatient Product Line Descriptions

Product Line	MDC	MDC Description
CIRC	5	Diseases and Disorders of the Circulatory System
DIGEST	6	Diseases and Disorders of the Digestive System
ENT	3	Diseases and Disorders of the Ear, Nose, Mouth, and Throat
GYN	13	Diseases and Disorders of the Female Reproductive System
MH	19	Mental Diseases and Disorders
MH	20	Alcohol/Drug Use and Alcohol/Drug Induced Organic Mental Disorders
NERVOUS	1	Diseases and Disorders of the Nervous System
NEWBORN	15	Newborns and Other Neonates with Conditions Originating in Perinatal
OB	14	Pregnancy, Childbirth, and the Puerperium
ORTHO	8	Diseases and Disorders of the Musculoskeletal System and Connective
OTHER	0	Unknown
OTHER	2	Diseases and Disorders of the Eye
OTHER	7	Diseases and Disorders of the Hepatobiliary System and Pancreas
OTHER	9	Diseases and Disorders of the Skin, Subcutaneous Tissue and Breast
OTHER	10	Endocrine, Nutritional and Metabolic Diseases and Disorders
OTHER	11	Diseases and Disorders of the Kidney and Urinary Tract
OTHER	12	Diseases and Disorders of the Male Reproductive System
OTHER	16	Diseases and Disorders of the Blood, Blood Forming Organs, Immunological
OTHER	17	Myeloproliferative Diseases and Disorders, Poorly Differentiated Neoplasm
OTHER	18	Infectious and Parasitic Diseases, Systemic or Unspecified Sites
OTHER	21	Injuries, Poisonings and Toxic Effects of Drugs
OTHER	22	Burns
OTHER	23	Factors Influencing Health Status and Other Contacts with Health Services
OTHER	24	Multiple Significant Trauma
OTHER	25	Human Immunodeficiency Virus Infections
RESP	4	Diseases and Disorders of the Respiratory System

Appendix4

Metric Code Sheet

METRIC	CALCULATION	DATA SOURCES
RVU PER SURGICAL HOUR	TOTAL MONTHLY SIMPLE RVU FOR SERVICE/TOTAL MONTLY IN-ROOM TIME	M2, S3
RVU PER ASSIGNED HOUR	TOTAL MONTHLY SIMPLE RVU FOR SERVICE/TOTAL MONTHLY HOURS ASSIGNED TO SERVICE	M2, S3
RVU PER STAFFED HOUR	TOTAL MONTHLY SIMPLE RVU FOR SERVICE/TOTAL MONTHLY STAFFED HOURS STEPPED DOWN TO SERVICE	M2, S3,EASIV
PROVIDER COST PER RVU	TOTAL MONTHLY PORTION OF SALARY ASSIGNED TO OR FOR SERVICE/TOTAL MONTHLY SIMPLE RVU FOR SERVICE	M2, EASIV
TOTAL COST PER RVU	TOTAL MONTHLY COSTS (SALARY+ DIRECT+STEP-DOWN – PERFORMANCE EARNINGS)ALLOCATED TO SERVICE/TOTAL MONTHLY SIMPLE RVU FOR SERVICE	M2, S3, EASIV
UTILIZATION	MONTHLY OR TIME USED BY A SERVICE/MONTHLY OR TIME ASSIGNED TO A SERVICE	S3